

Claims

[c1] What is claimed is:

1. A transmission line for a downhole tool, the transmission line comprising a generally tubular outer conductor; an inner conductor generally co-axially disposed within the outer conductor, and a dielectric material disposed intermediate the inner and outer conductors, the dielectric material initially loosely fitted relative to at least one of the outer and the inner conductors; wherein at least one of the outer and the inner conductors is further deformed to provide an interference fit with the dielectric material, such that independent motion between the outer conductor, inner conductor, and the dielectric material is substantially abated during deployment of the downhole tool.

[c2] 2. The transmission line of claim 1 wherein the downhole tool is selected from the group consisting of well casings, drill pipes, heavy weight drill pipes, drill collars, tool joints, jars, motors, turbines, batteries, shock absorbers, reamers, drill bits, pumps, hydraulic hammers, pneumatic hammers, electronic subs, logging subs, sensor subs, directional drilling subs, repeaters, swivels,

nodes, repeaters, and downhole assemblies.

- [c3] 3. The transmission line of claim 1, wherein the inner and the outer conductors comprise materials having electrical conductivity at least about 60% of the International Annealed Copper Standard (IACS).
- [c4] 4. The transmission line of claim 1, wherein an inside surface of the outer conductor is in contact with a material having electrical conductivity at least 60% of the IACS.
- [c5] 5. The transmission line of claim 1, wherein the inner conductor comprises a wire, a stranded wire, a braided wire, or a combination thereof.
- [c6] 6. The transmission line of claim 1, wherein the dielectric material is a substantially non-porous material.
- [c7] 7. The transmission line of claim 1, wherein the dielectric material is a substantially porous material.
- [c8] 8. The transmission line of claim 1, wherein the dielectric material comprises a gas.
- [c9] 9. The transmission line of claim 1, wherein the dielectric material comprises porous and/or non-porous, segmented beads.

- [c10] 10. The transmission line of claim 1, wherein the dielectric material comprises a gaseous material associated with a porous material.
- [c11] 11. The transmission line of claim 1, wherein the outer conductor has an outer surface, a portion of which exhibits a rough texture.
- [c12] 12. The transmission line of claim 1, wherein the outer conductor is attached to the downhole tool.
- [c13] 13. The transmission line of claim 12, wherein the outer conductor is attached to the downhole tool by with a clamp connection or a plug connector.
- [c14] 14. The transmission line of claim 12, wherein the outer conductor is attached to the downhole tool by a threaded connector.
- [c15] 15. The transmission line of claim 12, wherein the outer conductor is attached to the downhole tool by a liner disposed within said downhole tool.
- [c16] 16. The transmission line of claim 1, wherein the interference between the outer conductor, the dielectric, and the inner conductor is a diametric interference of between about 0.001 and about 0.005 inches.
- [c17] 17. The transmission line of claim 1, wherein the outer

conductor, the dielectric, and the inner conductor are in sufficient contact to withstand gravitational loads of between 100 and 500 g's.

- [c18] 18. The transmission line of claim 1, wherein the first conductor, the dielectric, and the second conductor are capable of elastic strain of at least about 0.3%.